

### **Sample questions:**

Q1. Is column-store ever a better model than PAX?

- (a) Column-store is always better.
- (b) PAX is always better.
- (c) Column-store is better when 90% of the queries are OLAP.
- (d) Column-store is better when 90% of the queries are OLTP.

Q2. Adam decides to build a two-level hierarchical index where level 1 is a sparse index and level 2 is a B+-tree. Adam makes the following statements about his design:

- (1) Level 1 as sparse index can reside fully in memory.
- (2) Level 2 supports  $O(\log N)$  search.
- (3) Keys in the sparse index map to the B+-tree, which helps in efficient traversal of the tree.
- (4) His design offers better lookup complexity than  $O(\log N)$ .

Which of the statements are false?

- (a) 2+3+4
- (b) 3+4
- (c) 1+4
- (d) 1+2+4

Q3: Harry modified the B+ index such that there is a direct link from root to the leftmost leaf of the B+ tree. Harry makes the following statements about his design:

- (1) Point queries are now  $O(1)$ .
- (2) Harry's modified B+ index is better than a linear hashmap.
- (3) A constant improvement in the time complexity of some range queries.
- (4) The modified B+ index has an improved storage.

Which of the statements are true?

- (a) 3
- (b) 1
- (c) 1+3
- (d) None of the above.

Q4: Ron does not like the eviction policy of cuckoo hashing as it can lead to an infinite loop of eviction. So he suggest a change in cuckoo hashing where instead of evicting an existing key, he suggests maintaining a list of keys. Specifically, like cuckoo hashing, for each key, we need to try both the hash functions and randomly select one position in the map. If that position is full, then try the position suggested by the other function. And, even if that is full, then add it to a list maintained by one of the position. Which of the statements are true about this design?

- (a) This new design is worse than linear probe hashing.
- (b) This new design is similar to chained hashing.
- (c) This new design guarantees  $O(1)$  search time.
- (d) None of the statements are true.

**Solutions:**

- (1): (c)
- (2): (b)
- (3): (a)
- (4): (b)